

# A New Species of *Holospira* (Gastropoda: Pulmonata) from Sonora, with the Reproductive Anatomy of *Holospira minima*

by

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*Abstract.* A new species, *Holospira milleri* Gilbertson, from the Rio Yaqui valley in eastern Sonora, Mexico, is described. The reproductive anatomy of another Sonoran species, *Holospira minima* von Martens, 1897, is illustrated and compared.

## INTRODUCTION

The northwestern Mexican states of Sonora and Sinaloa are geographically isolated from the rest of the country by the Sierra Madre Occidental and the Gulf of California. Because of these barriers, this region is inhabited by a special group of *Holospira* species (PILSBRY, 1953:151-156). Present knowledge of these species is based almost entirely on shell characteristics, mostly from river drift specimens; their reproductive anatomies have remained unknown. The majority (5 of 7) are members of the endemic subgenus *Allocoryphe* Pilsbry, 1946. The type species of *Allocoryphe* is *H. minima*.

Specimens of a new species described herein were first collected by Dr. Walter B. Miller of the University of Arizona along with his wife, Betty Sue, and graduate students Edna Naranjo-Garcia, Jane E. Deisler, and James E. Hoffman while on a field expedition to Sonora in November 1983. They remained unidentified until I initiated studies on the genus *Holospira* under Dr. Miller's sponsorship in 1987. Further field work in Sonora (and Sinaloa) should yield additional new species.

## SYSTEMATICS

### Family UROCOPTIDAE

Genus *Holospira* von Martens, 1860

Subgenus *Holospira* s.s. von Martens, 1860

*Holospira milleri* Gilbertson, sp. nov.

(Figures 1, 2)

**Diagnosis:** A moderately small *Holospira* with a tapered, quadrilamellate shell. The reproductive anatomy is char-

acterized by the lack of a spermathecal diverticulum and by the presence of a verge in the penial complex.

**Description of shell of holotype:** Shell light brown, thin, somewhat translucent with periostracum remaining between the axial riblets, turret-shaped, and comprised of 13.2 whorls. Embryonic whorls 2.5 in number, rounded, smooth, very slightly tilted, and tapered toward apex. Post-embryonic apical whorls 7 in number, strongly convex (subcarinate), also gradually tapered toward apex (not conic). Whorls of cylindrical portion nearly 4 in number, not quite as convex, with greatest diameter above midline, and approximately equal in size. All postembryonic whorls evenly, thinly striated with oblique axial riblets bent slightly at angle of whorl. Riblets on penultimate whorl ca. one-third width of intercostal space and 62 in number. Umbilicus perforate, 0.5 mm in diameter. Aperture slightly ovate. Peristome expanded and slightly extended from body whorl. Armature of 4 strong lamellae located in last half of penultimate whorl with the large parietal (superior) and axial extending into first third of body whorl (Figure 1C). Maximum height 12.4 mm, diameter 3.5 mm.

**Variations in paratypes:** Eleven representative paratypes range from 10.8 to 12.5 mm (mean 11.8) in length, and from 3.5 to 3.8 mm (mean 3.6) in diameter. Whorls number from 10.5 to 12.5 (mean 11.9). Basal and palatal lamellae less distinct in some paratypes compared with holotype. Embryonic and early whorls straight (not slightly tilted) in paratypes.

**Description of radula:** Radula similar to other described radulae in genus. Radular formula typically 15·7·1·7·15. Central and lateral teeth with single conic mesocone. First marginal tooth characterized by development of small ectocone which gradually enlarges on ensuing marginals;

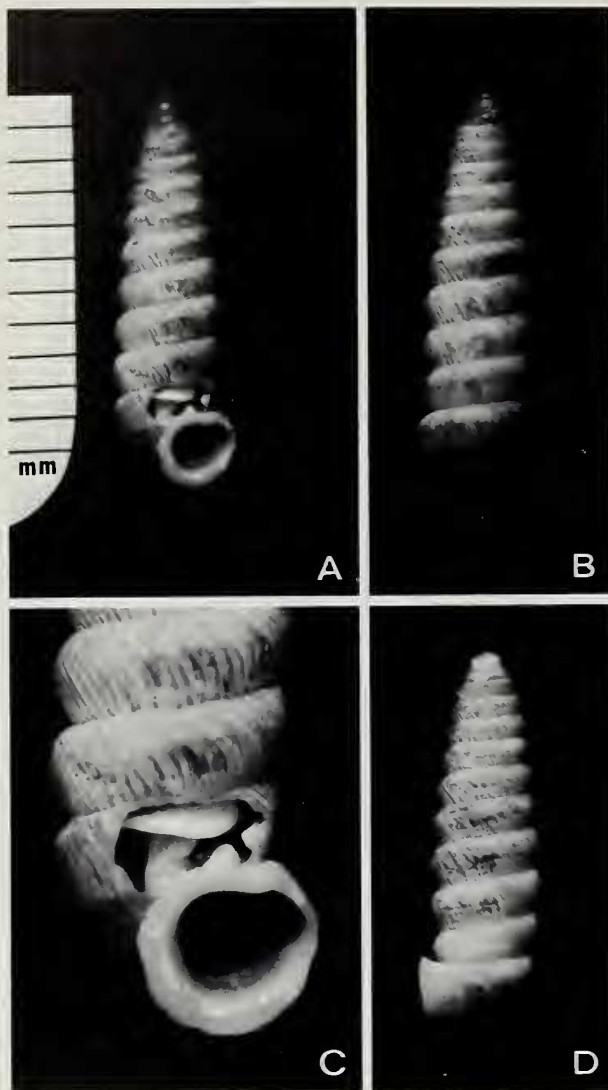


Figure 1

A, B, C. *Holospira milleri* Gilbertson, sp. nov., holotype, Santa Barbara Museum of Natural History No. 35042, apertural view, dorsal view, and enlargement to show lamellae. D. Side view of paratype.

mesocone becoming variably bifid on marginals ca. 7-14. Last marginal small and variable.

**Description of reproductive anatomy:** Description and measurements are of anatomy illustrated in Figure 2. Genital atrium connected to body wall by a short neck. Penis relatively small, expanding around a short, conical verge to summit of penial sac where it merges with epiphallus. Vas deferens descending along free oviduct, as usual, then proceeding upward along penis to epiphallus. Penial retractor muscle long and slender, inserting on apex of epi-

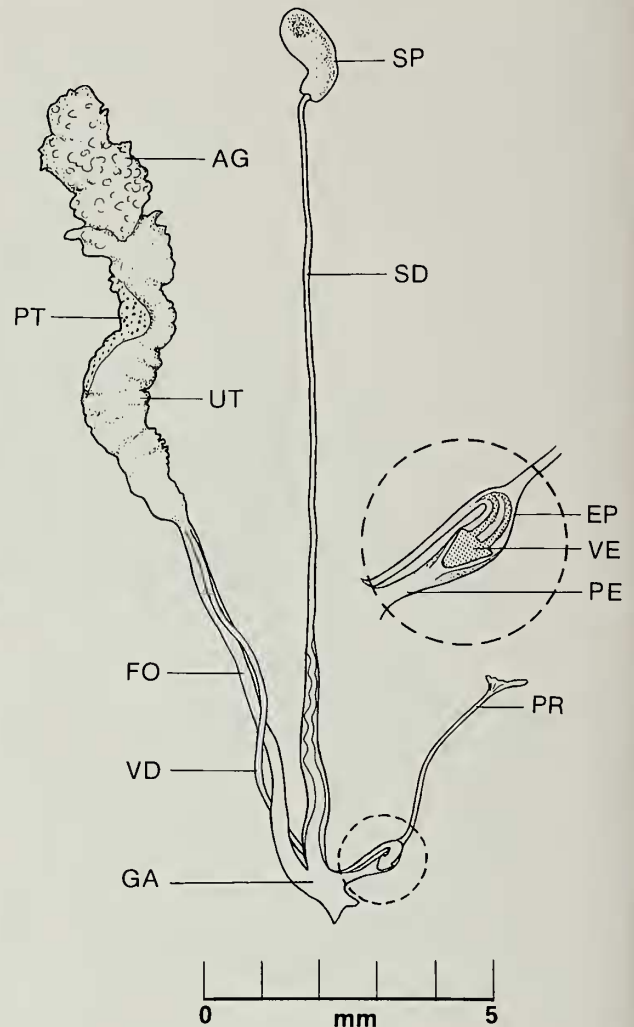


Figure 2

Reproductive system of *Holospira milleri*. Specimen collected at the type locality by W. B. Miller, 27 Nov. 1983. Shell broken for dissection. AG, albumen gland; EP, epiphallus; FO, free oviduct; GA, genital atrium; PE, penis; PR, penial retractor muscle; PT, prostate gland; SD, spermathecal duct; SP, spermatheca; UT, uterus; VE, verge; VD, vas deferens.

phallus. Spermathecal duct long, slender, lacking a diverticulum; basal portion widened, followed distally by a short section that is convoluted internally. Spermatheca comma-shaped and slightly invaginated where it receives spermathecal duct. Vagina lacking. Free oviduct slender and rather long. Uterus typically thickened and coiled with prostate gland imbedded in it. Albumen gland irregular in shape. Length measurements, in mm, of distinctive features as follows: penis, 0.8; spermathecal duct, 13.0; epiphallus, 0.4; spermatheca, 1.3; penial retractor, 3.2; free oviduct, 6.0.

**Type locality:** Sonora, Mexico: on the east side of the Rio Yaqui, under conglomerate rocks (containing calcite) in a ravine near the mouth of El Alamo wash, ca. 1.5 km south of the military footbridge at El Novillo; 28°58.1'N, 109°37.5'W; elevation ca. 260 m. This is within the Sinaloa thornscrub biome (BROWN, 1982). Dominant plants noted at the site include *Abutilon* sp., *Acacia cymbispina*, *Ceiba acuminata*, *Guaiacum coulteri*, *Lysiloma divaricata*, *Pachycereus pecten-aboriginum*, *Pithecellobium* sp., *Stenocereus thurberi*, and *Prosopis* sp. Access to the site is somewhat limited by the proximity of the Rio Yaqui and a nearby military installation.

**Disposition of types:** Holotype: Santa Barbara Museum of Natural History No. 35042. Paratypes: Academy of Natural Sciences of Philadelphia No. 371716; National Museum of Natural History No. 860423; University of Texas at El Paso No. 11108; Florida Museum of Natural History No. 122793; Universidad Nacional Autonoma de Mexico No. 1210; Field Museum of Natural History No. 208712; Walter B. Miller No. 7341.

**Etymology:** This species is named for my long-time friend and mentor, Dr. Walter B. Miller. I have benefited greatly from his insights and direction.

**Discussion:** There are, at present, six known extant species of *Holospira* occurring in Sonora (BEQUAERT & MILLER, 1973:142–143). These species, which include the primarily Arizonan *H. ferrissi* Pilsbry, 1905, are members of three subgenera.

Because it has a quadrilamellate shell, *Holospira milleri* is assigned to the subgenus *Holospira s.s.* The only other Sonoran (and Sinaloan) species in this subgenus is *H. cyclostoma* Pilsbry, 1953. The shell of *H. milleri* is similar to *H. cyclostoma* in size, and in the number of whorls. However, it differs by being thinner and more gradually tapered, and by possessing extremely convex whorls. In addition, *H. cyclostoma* was collected in drift material from arroyos near San Bernardo in southern Sonora and along the Rio Fuerte near San Blas in northern Sinaloa. These drainage systems are separate from the Rio Yaqui and ca. 200–275 km south of El Novillo. Since it is well known that most *Holospira* species are extremely localized in distribution, it is considered highly improbable that they could interbreed.

The remainder of the Sonoran species (excluding *Holospira ferrissi*) have one internal lamella (the axial), or none, as in *H. minima*, and are assigned to the subgenus *Allocoryphe*. The shell of a subspecies of one of these, *H. dentaxis striatella* Pilsbry, 1953, is similar in external appearance to *H. milleri*. It, too, is somewhat translucent and has strongly convex whorls; however, it is more strongly and vertically costate.

*Holospira milleri* is unique among *Holospira* species known thus far in regard to the reproductive anatomy by possessing a verge in the penial complex. It should prove interesting to see if *H. cyclostoma* has a verge.

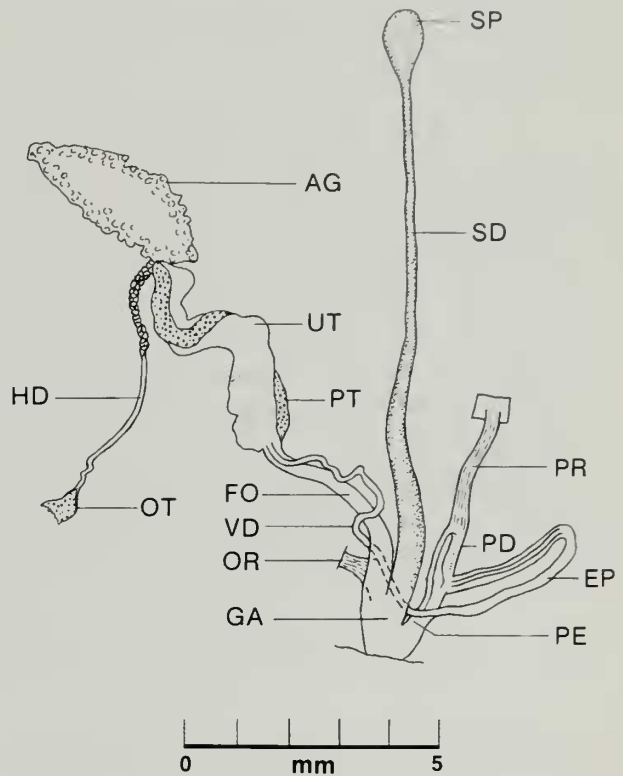


Figure 3

Reproductive system of *Holospira minima*. Specimen collected at Cerro de la Campana, Hermosillo (the type locality), by L. H. Gilbertson, 16 May 1987. Shell broken for dissection. AG, albumen gland; EP, epiphallus; FO, free oviduct; GA, genital atrium; HD, hermaphroditic duct; OR, oviducal retractor muscle; OT, region of ovotestis; PD, penial diverticulum; PE, penis; PR, penial retractor muscle; PT, prostate gland; SD, spermathecal duct; SP, spermatheca; UT, uterus; VD, vas deferens.

With 45 teeth per row, the radula of *Holospira milleri* is distinctively different from the radulae of the two other species in the subgenus *Holospira s.s.* for which the radula has been described, specifically *H. goldfussi* (Menke, 1847), and *H. nelsoni* Pilsbry, 1903, which have 53 and 55 teeth respectively (PILSBRY, 1903:69). Rather, it falls within the range of teeth found in species of the southern Mexican subgenus *Bostricocentrum* Strebel, 1880, which have 39–45 teeth per row (THOMPSON, 1964).

As expected, based on significant differences in shell morphology, the reproductive anatomy of *Holospira minima* (Figure 3) differs in several obvious respects from *H. milleri*. The male genitalia are larger, and its tubular epiphallus joins the penis laterally, thereby forming the penial diverticulum. The penial retractor muscle is wider, and inserts upon the apex of the penial diverticulum rather than upon the epiphallus as in *H. milleri*. Also, *H. minima* lacks a verge. Because of these anatomical differences, along with those of the shell, these two species apparently

have had distinctly divergent phylogenies. Their anatomies are similar in one important respect, however, that of lacking a spermathecal diverticulum.

#### ACKNOWLEDGMENTS

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collections. He prepared the stained, slide-mounted reproductive anatomy of *H. milleri* that is figured and described herein. He (along with E.N.-G. & J.E.H.) accompanied me to the site of *H. milleri*, and identified the plant species.

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